

State Oversampling in the National Survey of Children's Health: Feasibility, Cost, and FAQs

Sponsored primarily by the U.S. Department of Health and Human Services' (HHS) Health Resources and Services Administration's Maternal and Child Health Bureau (HRSA MCHB), the National Survey of Children's Health (NSCH) is designed to produce national and state-level data on the health and well-being of children under 18 years of age in the United States. The U.S. Census Bureau conducts the NSCH on the behalf of the HHS under Title 13, United States Code, Section 8(b), which allows the Census Bureau to conduct surveys on behalf of other agencies. Title 42 U.S.C. Section 701 (a)(2) allows HHS to collect information for the purpose of understanding the health and well-being of children in the United States.

State oversamples can support more targeted assessment, program planning, and evaluation. This document outlines oversampling strategies, costs, and alternative approaches to sub-state oversampling, namely the use of synthetic or model-based local area estimates. It also includes answers to frequently asked questions.

I. OVERSAMPLING STRATEGIES

Oversamples can be statewide, sub-state, or a combination of the two strategies.

(a) Statewide Oversampling follows the same sampling requirements as the base NSCH. Addresses are selected from across the state, and the probability of selection is not affected by the geographic location of an address within the state. The goal of a statewide oversample is to increase the number of completed interviews in a state, which may enable reporting for smaller populations or rare outcomes with greater precision (e.g., very young children or autism spectrum disorder). Statewide oversampling is straightforward and feasible for all states.

(b) Sub-State Oversampling targets addresses in select geographic areas within a state. The oversample can be designed to produce sub-state estimates (e.g. city, county, or region). A sub-state oversample can also target areas that have a higher density of a population of interest. For example, additional addresses can be selected from Census Tracts with larger American Indian/Alaska Native (AI/AN) populations. This type of targeted oversampling is more complex than a general statewide oversample and carries certain limitations. First, this approach changes the state-level sampling design from random sampling to cluster-based random sampling. If certain areas are sampled at a much higher rate than others, this design change can compromise the precision of overall state estimates. The oversample design must be consistent with the overarching mission of the NSCH to deliver the highest quality national and state-level estimates. To this end, large sub-state oversamples will often be coupled with a statewide oversample. Second, sub-state geographic indicators (e.g. the respondent's city, county, or region) are only available on restricted-access microdata files to protect the confidentiality of respondents. Thus, sub-state estimates can only be produced using restricted-access data files available through the [Federal Statistical Research Data Centers](#) (RDC). To access data in the

RDC, researchers must [submit a research proposal](#),¹ receive approval, and secure Special Sworn Status. RDC access may involve travel and fees² and all data products using restricted-access data must be approved by the Census Bureau's Disclosure Review Board prior to public release.

II. COSTS

General Calculations: The cost for either a statewide or sub-state oversample is driven by four factors: 1) the cost per sampled address; 2) the estimated number of sampled addresses per completed interview (topical questionnaire); 3) the desired sample size; and 4) the number of years to achieve the desired sample size.

- 1) **The estimated cost per sampled address for the 2023 NSCH is \$17.15;**² this includes the cost of materials (letters, envelopes, and paper questionnaires), postage, incentives, processing (data entry and cleaning), and survey planning and management. **Attachment A** provides a general breakdown of the cost per sampled address. This cost is re-evaluated annually to account for changes in costs.
- 2) **On average, the ratio of sampled addresses to completed interviews is about 6.1:1,** but that ratio varies across states. The ratio is based on the probability a sampled address represents a household with children (not a business, vacant address, or household without children) that completes a topical questionnaire. **Attachment B** of this document lists the estimated ratio of addresses to completed topical questionnaires by state for the 2023 NSCH based on 2020 and 2021 returns.
- 3) **Desired sample size depends on the goal of oversampling.** Achieving reasonable reliability of key estimates may be a good guide to determining a target sample size for the population of interest. Reliability is commonly measured with the coefficient of variation (CV) or relative standard error, which is the standard error as a percentage of the prevalence estimate, with a larger CV indicating poorer relative reliability. The CV is dependent on the standard error and the prevalence of the outcome of interest, and improves with increasing sample size and increasing prevalence. If the CV exceeds 30%, estimates are commonly suppressed or flagged as unreliable. It should be emphasized that an overall sample size may not accommodate reliable analysis of subgroups, including various Title V National Performance Measures within population domains (e.g., adolescents or CSHCN). **Attachment C** shows reporting reliability across National Performance Measures and may be helpful in determining total target sample sizes for populations of interest. For example, an overall county-level sample size of ~150 would be necessary to ensure ~30 CSHCN (24% of the unweighted national sample size) for the medical home CSHCN performance measure. A denominator of at least 30 is necessary to meet MCHB reporting standards but estimates would still have wide confidence intervals and poor precision at that minimum sample size. For full population performance measures, such as

¹ See <https://www.census.gov/about/adrm/ced/apply-for-access.html> for more information on the application process.

² There may be additional costs associated with accessing the Federal Statistical Research Data Centers (RDCs). These costs are not considered in this document.

preventive dental visit and household smoking, a sample size of 150 would generally enable reporting without any reliability flags. However, a sample size of over 300 would be needed to enable reporting for all performance measures and about half would still carry reliability flags.

- 4) Pooling data over multiple years of the general sample reduces cost by requiring less oversample to meet a target sample size.** For example, if a state seeks a target sample size of 150 AI/AN children and has ~50 completed interviews in the base sample annually, a total of 150 interviews could be completed by supplementing the base sample with an oversample that yields 100 interviews in one year (50 base + 100 additional), 25 interviews per year over two years (100 base + 50 additional), or combining three years of data without oversampling (150 base). Oversample interviews can also be pooled with base sample interviews from prior years that did not include an oversample.

Additional considerations for sub-state oversampling: Two additional factors influence the cost of a sub-state oversample:

- 1) *The number of sub-state units.* Grouping counties into county groups, for example, can substantially reduce the requirements of the sub-state oversample.
- 2) *The distribution of population across units.* For example, if population is concentrated in one county, the base sample will also be concentrated in that county (proportional to the population), so less of the base sample is contributing to the minimum sample requirements in the other counties. Counties with smaller population size may require substantial oversampling to achieve a minimum number of completed interviews.

Payment of the total agreement amount is needed prior to the start of work, otherwise known as advanced payment or payment in advance of a deliverable. 13 U.S.C. 8(b) requires that the Census Bureau receive advance payment. Therefore, each state that enters into an oversampling agreement is required to obligate the full cost of the agreement immediately after both parties have signed the Memorandum of Agreement (MOA) or alternative agreement documentation. The Census survey team can provide a standard agreement template upon request. **Attachment D** provides an outline of the agreement timeline including deadlines for each step in the process.

Census can work with individual states to determine an appropriate plan to address both data and budgetary concerns.

Example General Oversample Calculations: A state may want to increase their annual sample of CSHCN to improve reporting and precision of estimates. If their annual sample size is ~150 CSHCN and they want to double that to achieve a sample size of ~300, it would require doubling their overall sample. If the base NSCH selects 4,000 addresses, the oversample would need to add 4,000 addresses, which would result in about 574 interviews (4,000 addresses divided by 6.1 addresses per completed interview) for an estimated cost of \$68,600 (4,000 multiplied by \$17.15 per sampled address). State-specific values for the base number of interviews or addresses per completed interview (**Attachment B**) can be easily substituted here.

Example Sub-State Oversampling Calculations: A state has organized the counties in that state into 8 county groups and wants at least 150 completed interviews in each group. Census anticipates that 3 of the 8 groups will have at least 150 interviews from the base sample each year. The other 5 county groups will need additional sample to reach that threshold. Let us consider three strategies the state can pursue.

- One year of data collection with an oversample: Five county groups will be targeted for an oversample to reach 150 interviews in each group. Census estimates that the state will need 460 additional interviews, 3,220 addresses. The one-year oversample cost is \$55,223.
- Two years of data collection with two years of oversample: By combining two years of data, the number of interviews from oversample is reduced from 460 to 280, and the number of oversample addresses to 1,960. The total cost of \$33,614 is distributed over two years.
- Two years of data collection with one oversample: The state combines base sample interviews from the previous cycle with the current cycle. The oversample requirements are the same as in the previous strategy – 280 interviews and 1,960 addresses – but the oversample is completed in one year for the same cost of \$33,614.

See **Attachment E** for a relative cost by pooled years and minimum sample per county compared to a three-year investment for 150 completed interviews per county. **Attachment E** presents relative costs for a range of possibilities, but practically, 50 completed interviews is a minimum requirement for direct county-based estimates in most cases.

Examples: A target of 50 interviews per county over 1 year would incur only a third (33%) of the cost of 150 interviews per county over 3 years. A target of 300 interviews per county over 5 years would be double the cost (206%) of 150 interviews per county over 3 years.

III. ALTERNATIVES TO SUB-STATE OVERSAMPLING

(a) Synthetic Estimation: Synthetic or indirect estimation can also be used to produce county-level or other sub-state estimates with publicly available data.³ This is generally accomplished by multiplying sub-state sociodemographic characteristics from the American Community Survey (ACS) with state-level prevalence estimates from the NSCH for those sociodemographic characteristics. For example, county-level obesity estimates could be indirectly estimated by applying the state-level prevalence of obesity by race/ethnicity and poverty categories to the county-level distribution or proportion of children in each race/ethnicity and poverty category combination as estimated by the ACS. However, imposing prevalence rates of key health measures from a state population to a county based on the sociodemographic characteristics of that county can mask true geographic differences by assuming that variation is only a function of composition.

³ See “Local Uses of National and State Data” <https://www.childhealthdata.org/docs/nsch-docs/local-use-of-state-data-and-synthetic-estimates.pdf>

(b) Model-Based Estimation: County-level estimates can also be derived through multilevel regression models that nest observations within counties using non-publicly available geographic information through an RDC.⁴ Bayesian approaches can smooth or shrink imprecise county-level estimates toward a spatially weighted or overall state mean. Model-based estimates can be improved with sub-state oversampling, but with far lower sample requirements than a sub-state oversampling project designed for direct estimates alone. The requirements will vary by state, outcome of interest, and geographic granularity.

The Census Bureau's NSCH team is unable to provide technical support on analytic alternatives to direct estimates but can work with states to design an oversample and provide RDC access to confidential files for approved projects.

IV. FREQUENTLY ASKED QUESTIONS

If my state is interested in exploring or pursuing an oversample, what are the next steps?

After you've determined your specific interest (i.e. statewide or sub-state oversampling) and a target sample size, the Census Bureau can determine feasibility and develop a custom cost estimate. If the state wishes to proceed, a sampling plan and various agreements would need to be developed and approved. To begin discussions regarding your interest, please contact Ashley Hirai (AHirai@hrsa.gov) and Scott Albrecht (scott.albrecht@census.gov). Carolyn Pickering (Carolyn.M.Pickering@census.gov) and Leah Meyer (Leah.Meyer@census.gov) will assist with the agreement development process.

What is the timeline for sponsoring an oversample?

Oversampling plans, along with the feasibility evaluation of the Memorandum of Agreement (MOA) template, must be completed no later than the end of July in the year preceding the planned oversample. If the MOA template cannot be used, a complete and final set of proposed paperwork must be provided to Census by the end of July for Census's review and approval. For example, if a state is interested in a 2023 NSCH oversample, the initial steps mentioned would need to be completed by the end of July 2022. Development of the agreement package itself will occur between the end of July and the end of August. From that point, Census requires the interested party to do a "pre-review" to ensure they can proceed with the next step, agreement routing and review. This next step will extend through mid-November. Once approval of the agreement is received from the Office of General Counsel (OGC), Census will route the package for internal signature and then provide it back to the state for their final signature process along with a customer registration form. This final step should be completed by the end of December of the same year to be considered for inclusion in the upcoming survey cycle.

Data from the oversample will be available with the public release of survey data the year

⁴ For example, see Zgodic A, Eberth JM, Breneman CB, Wende ME, Kaczynski AT, Liese AD, McLain AC. Estimates of Childhood Overweight and Obesity at the Region, State, and County Levels: A Multilevel Small-Area Estimation Approach. *Am J Epidemiol*. 2021 Dec 1;190(12):2618-2629. doi: 10.1093/aje/kwab176. PMID: 34132329; PMCID: PMC8796862.

after data collection.⁵ Typically, this release occurs in the fall. Final data collection and data release schedules, as set by MCHB and Census, will be provided each year as soon as they are available.

Can you tell us how many extra oversample interviews we will need to meet a certain target number for a given population group or per county over 1, 3, and 5 years?

Yes, this is something that the Census Bureau can determine. By contrast, a state will have to determine their target, how sub-state units are delineated, and how many years they are willing to wait for multi-year estimates.

Can we target sampling for a particular demographic group rather than doing a general statewide oversample?

Households with a certain demographic characteristic can't be directly oversampled since this detail is unknown for individual households. However, an oversample can be targeted to geographic areas with a disproportionate representation of a population characteristic (e.g. AI/AN) as estimated from the American Community Survey. These projects will be evaluated on a case-by-case basis and could incur additional costs.

If our state purchases an oversample, why can't we get a special file to analyze that data with county identifiers? Do we really need to access the RDC?

To protect respondent confidentiality, the Census Bureau has restrictions on the level of geographic detail that can be reported on publicly available data products, including special files. Through Federal Statistical Research Data Centers (RDCs), researchers across the country can access restricted-use data files with additional granularity, including county identifiers, for approved research projects. It may be possible in the future to produce a public-use file with county identifiers using noise infusion or other methods to protect respondent confidentiality, but the protocol for this does not yet exist.

Are local or state-specific questions an option if we purchase an oversample?

Not at this time, and it is unclear whether or when it will be feasible to add local/state survey item options. Tailoring both web and print questionnaires would be necessary, adding costs to the survey operations overall, and may impact the timely release of new data which is currently approximately nine months after data collection. Adding global questions to the survey is a more immediately feasible option.

For an oversample dataset, will a new "weight" be calculated by the Census Bureau's NSCH team for county-level analyses?

Any oversampled cases will be part of the Public Use File and indistinguishable from other cases (county identifiers will not be included on a Public Use File). The weights for cases in oversampled states will account for the additional complexity of the oversample. Ultimately, national and state-level estimates will be prioritized when producing the public-use data file.

⁵ All interviews are included with the public-use microdata file, but some indicators, including some sub-state indicators are not available on the public-use file. These data can only be accessed from a RDC.

Attachment A – Estimated Total Cost per Sampled Address for NSCH 2023

Planning, Survey Management, Incentives, Commercially Printed Materials, Data Processing and Editing	\$5.55
Postage	\$4.50
Survey Invitation Package Preparation, Data Collection (Sorting, Check-In, and Data Capture of Mailed Returns), and Management of the Incentive Operation	\$6.25
Customer Assistance	\$0.85
Total	\$17.15
Estimates based on 2021 costs and anticipated 2023 survey design; costs will be re-evaluated annually	

**Attachment B - Ratio of Sampled Addresses to Completed Topical Questionnaires by State,
Estimated for the 2023 NSCH based on 2020 and 2021 Results**

State	Addresses per Completed Topical Questionnaire	State	Addresses per Completed Topical Questionnaire
Alabama	7.1	Missouri	5.2
Alaska	8.7	Montana	6.1
Arizona	7.1	Nebraska	5.0
Arkansas	7.4	Nevada	7.1
California	5.5	New Hampshire	5.0
Colorado	6.1	New Jersey	4.8
Connecticut	5.0	New Mexico	9.7
Delaware	6.0	New York	6.5
District of Columbia	6.1	North Carolina	6.8
Florida	6.8	North Dakota	5.7
Georgia	7.2	Ohio	6.5
Hawaii	7.3	Oklahoma	7.6
Idaho	5.2	Oregon	5.0
Illinois	5.3	Pennsylvania	5.2
Indiana	5.6	Rhode Island	6.4
Iowa	4.9	South Carolina	6.0
Kansas	5.2	South Dakota	5.8
Kentucky	6.1	Tennessee	6.5
Louisiana	8.6	Texas	7.3
Maine	6.4	Utah	4.1
Maryland	5.2	Vermont	5.0
Massachusetts	4.3	Virginia	5.0
Michigan	5.0	Washington	4.7
Minnesota	4.1	West Virginia	8.0
Mississippi	8.2	Wisconsin	4.2
		Wyoming	7.7

Attachment D – Memorandum of Agreement (MOA) Timeline

Step	Description	Start	Finish
1a	State/agency indicates interest and decides on type of oversample*	Upon initial interest	End of July 2022
1b	State/agency obtains approval to use generic MOA templates*		
2	Census drafts the agreement*	Beginning of August 2022	End of August 2022
3	State/agency routes agreement drafts for initial approval*	Beginning of September 2022	Mid October 2022
4	Census internal agreement routing (cannot begin until main agreement with MCHB is signed)	Mid October 2022	Mid-November 2022
5	Office of General Counsel (OGC) review and approval	Mid-November 2022	Mid-December 2022
6a	Servicing agency signature process	Mid-December 2022	End of December 2022
6b	Requesting agency signature process*	End of December 2022	Mid-January 2023
7	Requesting agency completes the customer registration form (if needed)	Mid-January 2023	End of January 2023
8	Agreement is recorded by finance and advance payment is collected	Mid-January 2023	First week of February 2023

*These steps must happen by their corresponding “Finish” dates in order to keep the agreement routing process on track and allow the state oversample to be considered for the current production cycle.

1. State Oversample Interest and Agreement Review

- a. State or agency (requesting agency)⁶ works with MCHB and Census (servicing agency) to decide on one of the two methods below:
 - i. State-Wide Oversampling
 - ii. Sub-State Level Oversampling⁷

Duration: Varies

Finish: End of July

- b. State or agency will be provided with the generic Memorandum of Agreement (MOA) templates for the specific type of oversample agreed upon in **Step 1a** to obtain approval for use. **If the state or agency is unable to use the generic MOA templates, additional negotiation time is needed (approximately 2-3 months).**⁸ The state or agency would also be required to provide the proposed modifications needed to the agreement documents in order to determine if Census can accept the revised terms. This will require additional consultation with our Department of Commerce Office of General Counsel (OGC).

Duration: Varies

Finish: End of July (accounting for 2-3 months after providing proposed revisions to template)

2. Once approval is obtained on the generic MOA template or OGC approves a modified version of the agreement, Census drafts the agreement and sends it back to the state or agency for initial routing.

Duration: Approximately 3-4 weeks

Finish: End of August

⁶ For clarification purposes, all instances of state, agency, or requesting agency are used interchangeably. Servicing agency is referring to the Census Bureau on behalf of the Maternal and Child Health Bureau.

⁷ Census staff will need to evaluate the number of potential sub-state level oversamples that can reasonably be done in a given survey year before the agreements are drafted. This is to ensure these oversampling projects are not going to detract from the base production survey/sample.

⁸ Initial review/approval of the generic MOA templates should occur no later than April-May of any given year to allow for the additional 2-3 months of negotiation time (if needed).

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Attachment D – cont.

3. State or agency routes the agreement draft for initial approval – **The agreement documents should not be signed by either party at this time, only routed through the requesting agency to approve content. Content is not final until the Department of Commerce OGC approves (see Step 6), after which signatures can be obtained by both servicing and requesting agency.**

Duration: Approximately 3-6 weeks

Finish: Mid October

4. Census routing – Agreement will then be routed through Census internal budget, policy, office of information security, and legal for approval. This step cannot begin until main agreement with MCHB is signed.

Duration: Approximately 4 weeks

Finish: Mid-November

**At this point, we would have a good idea of whether or not to include the state or agency oversample in the OMB 60-day notice which would be submitted sometime in mid-October.*

5. OGC electronic approval process⁹

Duration: 20-25 days (or 3-4 weeks)

Finish: Mid-December

6. Obtaining servicing & requesting agency signatures -

- a. Servicing agency signature (Census signs first):

Duration: 1-2 weeks

Finish: End of December

- b. Requesting agency signature:

Duration: 1-2 weeks

Finish: Mid-January

7. Each new requesting agency (i.e., if your organization has never had an agreement with Census in the past) will need to complete a Customer Registration Form (BC-1862(ef)) for the Census Finance Office. This form requests information such as the Customer Type (Federal or State), Tax Identification Number (TIN) or Employer Identification Number (EIN), and contact information for your organization (i.e., who is responsible for invoicing, financing, and accepting the agreement). Once completed, this form must be sent back to the Census securely either through a standard encryption process, or via our secure correspondence system called Kiteworks.¹⁰

Duration: 1-2 weeks

Finish: End of January

8. Once all final signatures and approvals are received on all documents, the agreement is recorded by finance and the IPAC is initiated typically during the 1st or 2nd week of the month.

Agreement complete: 1st week of January

⁹ OGC cannot provide clearance on the state or agency oversample agreements until the current year main survey agreement is cleared. This would be on or after October 1, 2022.

¹⁰ The secure file sharing system for Census is Kiteworks and can be accessed via this link: <https://sfc.doc.gov/>

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Attachment E – Estimated Relative Cost of Sub-State Oversampling Projects by Years Pooled and Minimum Interviews per County/County Group (3 Years, 150 Cases = 100)

Min. Interviews per County/ County Group	Years				
	1	2	3	4	5
20	10	7	6	4	3
30	18	14	11	9	8
40	25	21	17	15	13
50	33	28	24	21	19
60	41	35	31	28	25
70	49	43	38	34	31
80	57	51	45	41	38
90	65	59	53	48	44
100	73	67	60	55	51
110	81	75	68	63	58
120	89	83	76	70	66
130	97	91	84	78	73
140	106	98	92	86	80
150	114	106	100	94	88
160	122	114	108	102	95
170	130	122	116	109	103
180	138	130	124	117	111
190	146	138	132	125	119
200	154	146	140	133	127
210	163	154	148	141	135
220	171	162	156	149	143
230	179	170	164	157	151
240	187	179	172	165	159
250	195	187	179	173	167
260	203	195	187	181	175
270	212	203	195	189	183
280	220	211	203	197	191
290	228	219	211	205	198
300	236	227	219	213	206